

REMARKS

Applicants appreciate the thorough and detailed examination of the present application as evidenced by the Office Action dated February 11, 2008 (hereinafter, the "Office Action"). Applicants have provided the comments below to address the issues presented in the Office Action and in support of the patentability of the pending claims.

The Rejection Under 35 U.S.C. §112, Second Paragraph, Is Overcome

Claims 1, 4-6 and 11-15 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. *Office Action*, page 2. The Office Action states that the claimed limitation of a "metal thin dielectric film," as recited in Claim 1, is unclear as to whether said film is conductive (metal film) or insulating (dielectric film). *Id.*

Claim 1 is amended herein to change the term "metal thin dielectric film" to "metal oxide thin dielectric film." As such, Applicants believe that it is now clear that Claim 1 is directed to a dielectric metal oxide thin film. Thus, Applicants believe this rejection is now overcome and respectfully request that it be withdrawn.

Claims 1, 4-6 and 11-15 Are Patentable Over Lim In View of Li

Claims 1, 4-6 and 11-15 stand rejected under U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2003/0040196 to Lim et al. ("Lim") in view of U.S. Patent Application No. 2005/0151210 to Li et al. ("Li"). *Office Action*, page 2. The Office Action alleges that Lim teaches all of the features of pending Claim 1 except for the formation of an oxygen-deficient metal oxide film comprising La_2O_x , wherein $0 < x < 3$, but alleges that Li teaches lanthanum oxide having oxygen deficiency. *Office Action*, page 3. The Office Action further alleges that it would have been obvious to one having ordinary skill in the art at the time the invention was made to form Lim's lanthanum oxide having oxygen deficiency in order to improve the device characteristics, motivated by the teachings of Li who allegedly point out the advantages of using the disclosed impurity species. *Id.*

At the outset, Applicants emphasize that Lim does not teach or suggest the use of an oxygen deficient metal oxide film. In fact, Lim teaches away from such an oxygen deficient metal oxide film by stressing the importance of using an oxidizing agent when forming its metal oxide films. Specifically, Lim states:

In the existing atomic layer deposition method, the metal oxide is deposited using a MCl_x precursor and H_2O as a reaction gas. In the present invention, however, oxide is deposited using a reaction of an organic substance precursor with oxygen radical.

Lim, para. 67, *emphasis added.*

With respect to Figure 5C, Lim only describes stacking metal oxide films, wherein one metal oxide film is comprised of one metal M_1 and the other metal oxide film is comprised of a different metal M_2 . M_1 and M_2 are explicitly stated to be two different metals, and Lim provides no motivation to use the same metal as M_1 and M_2 . Furthermore, the invention embodied by the pending claims is directed to reducing or preventing the oxidation of the underlying lower electrode, and Lim's stacking of two different metal oxides is not directed toward solving this problem, so one of ordinary skill in the art would not have been motivated to make the first metal oxide film oxygen-deficient based on the teachings of Lim.

Applicants further submit that the combination of Lim and Li is inappropriate. Although Li does briefly mention oxygen-deficient lanthanum, it is mentioned as an impurity species doped into a conductive oxide. Li, para. 29. The impurity species is added to modify the resistance of the conductive oxide. *Id.* As such, Li does not teach the formation of any oxygen-deficient metal oxide dielectric film comprising La_2O_x . Furthermore, there is no teaching or suggestion in Li that would have motivated one of ordinary skill in the art at the time of the invention to use the oxygen-deficient lanthanum oxide impurity species in Li as one of the metal oxide films in Lim. The Office Action alleges that this motivation would come from the teachings of Li because of the supposed advantages of using the disclosed impurity species. However, Li only describes the advantages of using such a compound as a

dopant in a conductive oxide, and as such provides no motivation to include such a compound in the dielectric metal oxide film of Lim.

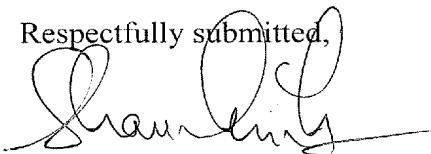
As such, for at least these reasons, Applicants submit that Claims 1, 4-6 and 11-15 are patentable over Lim in view of Li. Therefore, Applicants respectfully request that the present rejection be withdrawn.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request that all outstanding rejections to the claims be withdrawn.

The Examiner is invited and encouraged to contact the undersigned directly if such contact will expedite the prosecution of the pending claims to issue. In any event, any questions that the Examiner may have should be directed to the undersigned, who may be reached at (919) 854-1400.

Respectfully submitted,



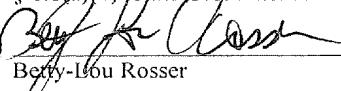
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I hereby certify that this correspondence is being transmitted via the Office electronic filing system in accordance with § 1.6(a)(4) to the U.S. Patent and Trademark Office on May 2, 2008.



Betty-Lou Rosser